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Comparison of colour and texture between entire and deboned dry-cured leg of lamb (#551)

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Introduction

Dry-cured leg of lamb (fenalår), entire and deboned, are commonly produced in Norway. Traditional elaboration process consisted on cutting the leg with the aitch bone kept on, salted, dried and sometimes smoked. Fast deboned fenalår is produced from deboned legs which are salted once netted and dried, sometimes smoked, and pressed. In spite of the long tradition, this product is not well characterized.

The aim of our study was to compare both elaboration processes and the colour and textural characteristics of Traditional bone-in and Fast deboned fenalårs. Effect of salt reduction and non-nitrite salt addition on texture and colour in deboned hams was also studied. Pros and cons of both elaboration processes will also be discussed.

Methods

Elaboration procedures: Table 1 gives an overview over the details in the production process where it differs in the general process described in the introduction.

Instrumental texture and colour analysis: Traditional bone-in fenalår with standard (SS, n=3) and reduced (SR, n=3) salt contents were used. Fast deboned fenalår with standard (SS; n=10), reduced (SR; n=10) and Non-Nitrite Reduced (NNSR; n=10) salt contents were evaluated. Colour was instrumentally evaluated by using the CIE Lab space. Texture was evaluated by using the Stress relaxation test in which initial force F_0 (kg) and force decay at 2 s (Y_2) and 90 s (Y_{90}) were calculated.

Table 1: Elaboration procedures for the Traditional bone-in and the Fast deboned fenalårs.

	Traditional bone-in fenalår	Fast deboned fenalår
Time of process	45–60 days	89–130 days
Cutting	Bone in	Deboned (without Semimembranosus muscle)
Salting	3–4 days covered in salt at 4 °C SS: 8% salt + 144ppm NO2- SR: 6% salt + 144 ppm NO2-	In vacuum bags SS: 4.8% salt + 144ppm NO2- SR: 3.9% salt + 144 ppm NO2- NNSR: 3.9% salt
Salt used	Fine salt, nitrite salt, or coarse marine salt	Nitrite – salt and fine salt
Post salting	14–21 days at 4 °C	28 days at 4 °C
Drying and maturation	30–40 days, 14 °C	35–45 days at 13 °C
Final weight loss	35–38%	38–42 %
NaCl in finished product	6–8 %	6–9 %

a_w in finished product	Below 0.90	Below 0.91
Binding problems	No	Yes

Results
Colour

Elaboration procedures (Traditional bone-in and Fast deboned) and salting treatments (SS and SR) produced a significant effect in a^* and b^* values, showing an increase of both parameters in salt reduced fenalårs more pronounced in Traditional bone-in. Higher redness values were observed in Fast deboned fenalårs probably due to the shorter curing process. L^* value was only affected by the elaboration procedure, showing a decrease of lightness in Fast deboned fenalår (Table 2). In Fast deboned fenalår, a significant decrease of redness was observed when no nitrite was used (NNSR) ($p < 0.05$).

Table 2: Effect of the elaboration procedures and salting treatment together with their interaction on the instrumental colour of the fenalår.

LSMeans	Salting treatment	Traditional bone-in fenalår	Fast deboned fenalår
L^*	SS	36.29 ^{abx}	33.99 ^{by}
	SR	36.14 ^{bx}	33.67 ^{bx}
a^*	SS	7.41 ^{ay}	12.18 ^{ax}
	SR	11.11 ^{by}	12.65 ^{bx}
b^*	SS	2.75 ^{ay}	4.64 ^{ax}
	SR	4.73 ^{bx}	5.02 ^{bx}

^{ab}Within the same column, different letters means significant differences on the salting treatment ($p < 0.05$). ^{xy}Within the same raw, different letters means significant differences due to the elaboration process ($p < 0.05$).

Texture

A significant interaction between elaboration procedures and salting treatments was also found. F_0 decreases and Y_{90} increases when decreasing salt content in a higher extent when fenalår is produced according to Fast deboned procedure (Table 3). Thus, softer textures are found in deboned salt reduced fenalårs.

Table 3: Effect of the instrumental texture on fenalår produced by using different elaboration procedures and salting treatments.

LSMeans	Salting treatment	Traditional bone-in fenalår	Fast deboned fenalår
F_0 (Kg)	SS	5.242 ^{bx}	1.604 ^{by}
	SR	2.138 ^{bx}	1.215 ^{bx}

Notes

Y ₂	SS	0.368 ^{a,y}	0.404 ^{a,x}
	SR	0.447 ^{b,x}	0.428 ^{b,x}
Y ₉₀	SS	0.668 ^{a,y}	0.713 ^{a,x}
	SR	0.746 ^{b,x}	0.738 ^{b,x}

^{ab}Within the same column, different letters means significant differences on the salting treatment ($p < 0.05$). ^{xy}Within the same raw, different letters means significant differences due to the elaboration process ($p < 0.05$).

Entire fenalår are safer and easier to produce, but usually sold in one piece, which can be too expensive for many consumers and difficult to slice. Fast deboned fenalår is more challenging to produce, but it is well appreciated by the consumers for its convenience. The most common production problem is the low stickiness between the muscles, which may result in cracks and hollow areas inside the fenalår (Figure 1). Problems like growth of mould and brown discoloration inside the fenalår may appear. Improvements in the elaboration process to help the binding between muscles are still needed.

Conclusion

Fast deboned fenalår are challenging to produce, since soft textures, important changes on colour and problems in the elaboration procedures can occur, especially in salt reduced processes.

Acknowledgements

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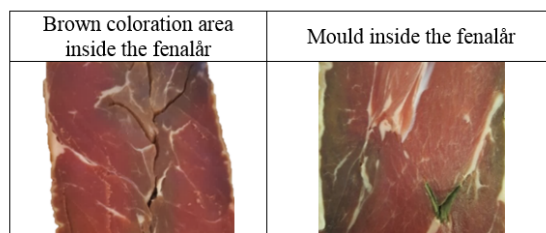


Figure 1: Most common problems during the elaboration process of the Fast deboned fenalår

Figure 1:

Most common problems during the elaboration process of the fast deboned fenalår.

Notes